



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/077,554	02/15/2002	Chad A. Cobbley	MTI-31591	3265
22202	7590	06/28/2006	EXAMINER	
WHYTE HIRSCHBOECK DUDEK S C			TRINH, HOA B	
555 EAST WELLS STREET			ART UNIT	
SUITE 1900			PAPER NUMBER	
MILWAUKEE, WI 53202			2814	

DATE MAILED: 06/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/077,554

Applicant(s)

COBBLEY ET AL.

Examiner

Vikki H. Trinh

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE
MONTH(S) FROM

THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 16, 17, 19, 21-32, 34-39, 41-76 and 85 is/are pending in the application.

4a) Of the above claim(s) 19, 21-22, 25-27, 29-32, 36, 38-39, 41-43, 50-54, 59, and 61 is/are withdrawn from consideration.

- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 16, 17, 23, 24, 28, 34, 35, 37, 44-49, 55-58, 60, 62-76 and 85 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20060624
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. This application contains claims 19, 21-22, 25-27, 29-32, 36, 38-39, 41-43, 50-54, 59, and 61 drawn to an invention nonelected with traverse. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, and 85, are rejected under 35 U.S.C. 102(b) as being anticipated by Mallik et al. (4,891,687) (hereinafter Mallik).

As to claims 1 and 85, Mallik discloses a semiconductor device and method having a substrate 30 and a molded stiffener 31 (fig. 9) molded onto and secured to the substrate 30 without attachment with an adhesive element. (see fig. 9 and fig. 12). Note that the term “molded” denotes a process step which pertains to an intermediate process that does not affect the final structure of the product. Another words, the patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See also MPEP 2113.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-8, 11, 37, 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallik, as applied to claim 1 above, in view of Lim et al. (6,020,221).

Mallik discloses the invention substantially as claimed. Note for claims 1 and 85 that how the stiffener is made either by molding or stamping pertains to an intermediate process that does not affect the final structure of the device. See MPEP 2113.

However, Mallik does not teach that the substrate is made of material such as polymer, polyamide layer, a bismaleimide triazine (BT) resin, an FR4 laminate, an FR5 laminate, a CEM1 laminate, a CEM3 laminate, and a ceramic metal frame.

Lim et al. (Lim) teaches a semiconductor device 10 having a chip 12, a substrate 14 and a stiffener 20, wherein the thermal coefficient (col. 2, lines 64-67) of the substrate and the stiffener expands equally when heat is applied to both layers. (See fig. 8). The substrate is made of a ceramic, laminate, polymer, polyamide, BT –FR5, and FR-4 materials (col. 5, lines 55-60, col. 1, lines 40-410.)

Mallik and Lim are in the same field of improving a packaging device for a semiconductor chip.

Therefore, as to claim 2, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Mallik with various materials, as taught by Lim, so as to provide a coefficient of a thermal expansion similar to that of the stiffener. (col. 2, lines 62-67)

As to claims 3-8, the combined teaching of Mallik and Lim does not explicitly teach that the substrate has a range of thickness from 35-100 microns. Nonetheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct the substrate with a specific range, since it is a prima facie obvious to an artisan for optimization and experimentation with a specific range of thickness because applicant has not yet established any criticality for the specific range.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the

Art Unit: 2814

applicant must show that the chosen dimensions are critical. (In re Woodruff, 919 F.2d 1575, 1578 (Fed. Cir. 1990).)

6. Claims 9-11, 16-17, 23-24, 28, 34-35, 44-46, 48-49, 55-58, 60, and 62-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallik, as applied to claim 1, in view of Admitted Prior Art (APA), figures 1-2 and specification (spec.), pages 1-2.

Mallik discloses a semiconductor device and method having a substrate 30 and a molded stiffener 31 (fig. 9) molded onto and secured to the substrate 30 without attachment with an adhesive element. (see fig. 9 and fig. 12).. However, Mallik does not disclose that the stiffener is made of a thermoplastic material.

APA discloses a semiconductor device and method having a substrate or lead frame 6 (fig. 1 and spec., page 1, line 13); and a stiffener 14 molded to the substrate 6 (fig. 1). See attachment. As to claims 9-10, 23-24, 55-58 and 67-74, the molded stiffener 14 comprises of thermoplastic or thermosetting polymeric material (spec., page 2, line 12). Note that the molded stiffener is heated and cool to cure the material for hardening.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Mallik with the thermoplastic/thermosetting material for the stiffener, as taught by APA, so as to provide a cheaper material.

As to claim 11, APA teaches that the thermal coefficient of the expansion of the molded stiffener 14 (fig. 1) and the substrate 6 (fig. 1) correspond such that when heating is applied both the stiffener and the substrate expand roughly the same. See attachment.

As to claims 44-46 and 64-66, 75, APA teaches that the molded stiffener 14 is transfer molded, injection molded, or spray molded to the substrate with encapsulating material 16 (fig.

Art Unit: 2814

1), adhesive material 12, or both type of materials for attaching the stiffener onto the substrate 6 (fig. 1).

As to claims 16 and 28, APA teaches the stiffener 14 has one cross member 12 (fig. 1).

As to claim 17, APA teaches the stiffener is in a form of a grid, lattice, a grille, and a web (fig. 1).

As to claims 48-49 and 76, APA teaches the substrate 6 (fig. 1) has two or more compartments 8 for receiving dies 10 (fig. 1).

As to claim 23, APA teaches the substrate 6 (fig. 1) is in a reel form before the stiffener 14 is being molded.

As to claim 24, Mallik teaches the semiconductor device having a substrate 30 (fig. 9) and a stiffener 31 molded to the first surface of the substrate 30 (fig. 9).

As to claims 34 and 60, Mallik's semiconductor device has a substrate 30 (fig. 9); a die 50, and a stiffener 31 molded on the substrate 30.

As to claims 35 and 62-63, Mallik's stiffener 31 is disposed at the periphery of the substrate 30 (fig. 9).

Art Unit: 2814

1. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mallik in view of APA, as applied to above claim 44, and further in view of Culnane et al. (6,517,662).

Mallik in view of APA discloses the invention substantially as claimed. However, Mallik and APA do not explicitly teach that the stiffener is bonded to the substrate by way of heating, cooling, and curing.

Culnane teaches a semiconductor device 1 (fig. 1) having a substrate 4 or substrate 14, a chip 8 (fig. 1), a stiffener 10 or a solder ball 13. The substrate 4 has a thickness from 40-60 microns (col. 3, lines 25-30). Culnane also teaches that the substrate 4 has holes or recesses 9 for the stiffeners 13 to be disposed or molded therein. (See fig. 1). Also the stiffeners 13 or solder balls 13 are different from the stiffeners 13, wherein the first stiffeners are disposed on one side of the substrate 4 and the stiffeners 13 are disposed on the other side of the substrate 4 (fig. 1). Furthermore, the stiffener is bonded to the substrate by way of heating, cooling, and curing (col. 6, lines 34-50).

Mallik, APA and Culnane are in the same field of improving a packaging device for a semiconductor chip.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Mallik in view of APA with the step for the stiffener to bond by way of heating, cooling, and curing, as taught by Culnane, so as to construct the substrate (Culnane, col. 6, lines 34-50).

Response to Arguments

7. Applicant's arguments filed 4/19/06, have been fully considered but they are not persuasive.

In the remarks, applicants argue the rejection of claims 1 and 85 under 35 USC 102(b) as being anticipated by Malik. In particular, applicants argue that Malik does not disclose a “molded” stiffener. As stated in the rejection, applicants direct the claims 1 and 85 to a device. Thus, the term “molded” denotes a process step which pertains to an intermediate process that does not affect the final structure of the product. For process-by-product claim, the patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Thus, Malik is properly applied in rejecting claims 1 and 85.

8. In the rejection of Claims 9-11, 16-17, 23-24, 28, 34-35, 44-46, 48-49, 55-58, 60, and 62-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malik in view of Admitted Prior Art (APA), applicants argue the references can not be combined. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Malik and APA are in the same field of endeavors. Thus, one of ordinary skill in the art recognizes that the teaching of Malik and APA can produce the claimed invention.

Art Unit: 2814

9. With respect to claim 47, Culnane is also in the same field of endeavors. Culnane teaches the bonding of the stiffener to the substrate by the claimed process. Thus, Culnane cures the deficiency in Malik and APA.

10. With respect to applicants' argument of the rejection of claims 34-35 and 60, the claims do not recite any "index hole". Thus, the argument is moot.

11. With respect to the argument regarding to the rejection of claims 2-8, 11, 37, applicants allege that Malik and Lim are not capable to combine. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Malik and Lim are in the same field of endeavors. Thus, the teaching of Lim cures the deficiency in Malik.

12. For the fore going reasons, the rejections are maintained.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

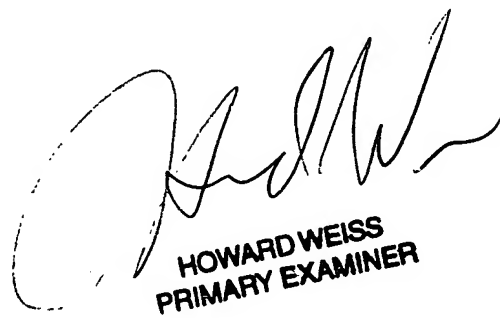
Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspro.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from

commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814



HOWARD WEISS
PRIMARY EXAMINER